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Order Discocephali

The Remoras

Jaws firmly fixed, not protractile. Maxillary slender, united with premaxillary. Dentary united with articular bone only at front end of latter, freely mobile. Skull broad, greatly depressed, and level or concave above. Basis cranii simple. No suborbital stay. Spinous dorsal developed as suctorial laminated disk on top of head. Pectoral rays attached on small perforate scapula and on 4 hour-glass-shaped pterygials, 3 of which in contact with coracoid.

Two families, one included below and the other extinct. The latter with suctorial laminae narrower and stronger median projection to each undivided.

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Family Echeneidae
The Remoras

Body fusiform, elongate. Mouth wide. Bands of villiform teeth in jaws, on vomer, palatines and usually on tongue. Pre-maxillaries not protractile. Lower jaw projects beyond upper. Opercle unarmed. Gill membranes not united, free from isthmus. Gills 4, slit behind fourth. Gill rakers short. Pseudobranchiae obsolete. Branchiostegals 7. No air vessel. Several pyloric appendages. Vertebral 23 to 30, of which 14 caudal. Body covered with minute cycloid scales. Spinous dorsal modified as sucking disk on top of head and neck, formed of double series of transverse movable

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cartilaginous plates, serrated on
hind or free edges. Dorsal and
anal long, without spines,
opposite. Caudal emarginate
or rounded. Pectorals high.
Ventrals thoracic, close together,
with spine and 5 rays. No
caudal keel or finlets.

Fishes of moderate size,
often found attached to sharks
or other large fishes and floating
objects by means of the dorsal
disk, and thus carried for
great distances in the sea.

Analysis of genera

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a. Remorinae. Body shorter, rather oblong; lower jaw not extended as flap; pectorals rounded; ventral broadly adnate to abdomen.

b. Pectoral rays all flexible. Remora

b.² Pectoral with upper rays osseous, firm, little pliable or flexible. Rhombichirus

a.² Echeneiinae. Body very slender, elongated; lower jaw extended in flap; pectoral acute, rays flexible; ventrals narrowly adnate to abdomen.

c. Disk laminae 10. Phtheichthys

c.² Disk laminae 20 to 28. Echeneis

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Genus Remora Forster

The Remoras

Remora Forster, Cat. Animals of North America, p. 20, 1771. (Type Echeneis remora Linnaeus, tantotypic.) (no description.)

Remoropsis Gill, Proc. Acad. Nat. Sci. Philadelphia, p. 88, 1863. (Type Echeneis brachyptera Lowe, monotypic.)

Remorina Jordan and Evermann, Rep. U. S. Fish Comm., pt. 21, p. 490, 1896. (Type Echeneis albescens Schlegel, monotypic.)

Body rather robust, broadly ²³⁶² depressed anteriorly. Head moderate. Snout depressed. Eye lateral, nearly median in head length. Mouth horizontal, lower jaw not produced in flap. Teeth in bands in jaws, outer larger. Gill rakers lanceolate. Skin smooth. Vertebrae 27, of which 15 caudal. Disk rather short, plates 13 to 18. Second dorsal and anal moderate, rays 20 to 30. Caudal subtruncate. Pectoral rounded, rays soft, pliable or flexible. Ventral long as pectoral.

Remora albescens (Schlegel)

2363

Echeneis albescens Schlegel, Fauna
Japonica, Poiss., pt. 15, p. 272, pl. 120,
fig. 4, 1850 (type locality, Japan).

— Bleeker, Act. Soc. Sci. Ind.
Néerl., vol. 6, no. 2, p. (3) 20, 1859
(Doreh, New Guinea). — Günther,
Cat. Fish. Brit. Mus., vol. 8, p. 377,
1860 (China);

Journ. Mus. Godeffroy, vol. 5, pt. 11, p.
155, 1876 (probably South Seas).

— Streets, Bull. U. S. Nat. Mus., no. 7,
p. 54, 1877 (La Paz Bay, Lower California).

— Day, Fishes of India, pt. 2, p. 258,
pl. 157, fig. 2, 1876 (India).

— Günther, Rep. Voy. Challenger, vol. 31,
pt. 2, p. 18, 1888 (1889) (north of New
Guinea). — Day, Fauna British India,

Fishes, vol. 2, p. 245, 1889. — Sauvage, Hist. Madagascar,
Poiss., p. 320, 1891 (Réunion).

— Bleeker, Verhand. Kon. Akad. Wet.
(Amsterdam, Gaf.) vol. 18, p. 15, 1879
(reference).

- Horman, Ann. Mag. Nat. Hist. London,
ser. 9, vol. 9, p. 322, 1922 (Natal).—
Barnard, Ann. South African Mus., vol. 21,
pt. 2, p. 421, Oct. 1927 (East London; Natal).
— Fowler, Mem. Bishop Mus., vol. 10,
p. 419, 1928 (compiled).

2365

Remora albescens Jordan and Snyder,
Annot. Zool. Japon., ^{vol. 3,} p. 110, 1901
(reference). — Franz, Abhandl. Kon.
Bayer. Akad. Wiss., Vol. 4, Suppl.
Band 1, p. 69, 1910 (Aburatsubo).
— Fowler, The Fish Culturist,
p. 115, Jan. 1935 (on Manta birostris
at ^{fig.} Brielle, N. J.).

Remorina albescens Jordan, Tanaka and
Snyder, Journ. College Sci. Tokyo, vol. 33,
p. 311, 1913 (reference). — Jordan and
Hubbs, Mem. Carnegie Mus., vol. 10, no.
2, p. 294, ^{June 27,} 1925 (hisaki).

- Echeneis clypeata Günther, Ann. Mag. Nat. Hist. London, ser. 3, vol. 5, p. 401, 1860 (type locality, Cape Seas); Cat. Fish. Brit. Mus., vol. 2, p. 376, 1860 (Cape Seas); ^{Zool. Record, Pisces, p. 155, 1864 (synonym);} Journ. Mus. Godeffroy, vol. 5, pt. 11, p. 155, 1876 (probably Pacific Ocean); — Gilchrist and Thompson, Ann. Durban Mus., vol. 1, pt. 4, p. 404, 1917 (Natal). — Thompson, Mar. Biol. Rep. Fisher. South Africa, vol. 4, p. 131, 1918.
- Tanaka, Fig. Descript. Fish. Japan, vol. 18, pl. 90, 1914; vol. 19, p. 334, 1915.
- Fowler, Mem. Bishop Mus., vol. 10, p. 419, 1928 (compiled).

Echeneis clypeatus

Compt. Rend. Acad. Sci. Paris, vol. 47, p. 378,
1858.

Echeneis lophioïdes Guichenot,^v Notes Ile
Réunion, Aff. p. 20, 1862 (type locality,
Réunion).

Depth $7\frac{1}{2}$ to $7\frac{3}{4}$; head $3\frac{4}{5}$, width $1\frac{1}{10}$ to $1\frac{1}{8}$. Snout, in profile, $2\frac{1}{5}$ to $3\frac{1}{4}$ in head from snout tip; eye $7\frac{1}{4}$ to $10\frac{1}{2}$, 3 in snout, 6 to 9 across interorbital; maxillary reaches $2\frac{1}{4}$ to $2\frac{2}{3}$ in head from snout tip; teeth in broad bands, villiform, lower exposed with outer slightly larger, fewer or more scattered; interorbital $1\frac{1}{10}$ to $1\frac{1}{4}$, level, contour of disk as seen from above ellipsoid.

Skin firm, tough and rather smooth or finely villose to velvety. Fins all covered with thick skin; rays little distinct unless dissected out.

D. XIII—17, disk length $1\frac{4}{5}$ to second dorsal origin, width $1\frac{3}{5}$ in its length, fin height $2\frac{3}{4}$ in total head length; A. 19, fin height $2\frac{4}{5}$, fin length $1\frac{1}{5}$ to $1\frac{1}{4}$;

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caudal, $1\frac{1}{3}$ to $1\frac{3}{5}$, truncate behind;
least depth of caudal peduncle
 $3\frac{3}{4}$ to 5; pectoral rays 16 or 17,
first 3 or 4 osseous or pungent
and fin rather firm, fin $1\frac{2}{5}$ to
 $1\frac{3}{5}$ in total head length; ventral
2, rays I, 5.

Gray or gray brown, more
or less uniform. Fins and
lower regions more or less
varied with whitish, gray
tints as cloudings. Pectoral
with whitish margin. Disk pale.

Cosmopolitan in all tropical
seas, and seldom reported
except as it may be found with
the Giant Devil Ray (Manta
birostris). Known as the Gray
Remora and first made known
by Schlegel, apparently from
a single specimen and without
knowledge of association with its

usual host. Likewise most all²³⁷⁰
subsequent investigators fail to
mention any host, or object it
accompanies. Gill in his "Story
of the Devil Fish" in 1908, quotes
from Elliott, Streets, and
Pellegrin, and concludes from
their determinations that the
remora accompanying the Giant
Devil Fish is the Short Remora
(Remora remora). I thought this
species is often frequent on
large sharks I have never found
it on the Giant Devil Fish.
Moreover the Gray Remora rarely
reaches ten inches, while the
Short Remora may reach fifteen
inches. The Gray Remora is
best distinguished by few ribs
in the disk on the head (13 or
14), while in the Short Remora
they are more numerous (18). The

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latter fish is also usually of much darker color.

Gray Remoras are very active, usually hanging about their host, often remaining attached when drawn from the water. They may be seen moving along the surface of the ray for more advantageous position in their endeavour to feed. It is astonishing how agile these remoras are, and if they attach and their host happens to be submerged in the water, or even if only partly so, they rapidly dart away and attach somewhere else. They remind one of nothing so much as an annoying fly. To try and capture them with a hand net is nearly impossible. I have never seen this species of remora attached to the sail, fish, the marlin or the broad bill, and do not believe it ever

accompanies them.

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The food of this remora, like that of most other species, appears to consist of most any substance their host devours, besides any offal it may pass. In 1930 I examined five specimens all from Giant Devil Fishes taken by the Pinchot Expedition in the Marquesas and Galapagos Islands. One of the Marquesas specimens was taken from a Devil Fish's stomach alive, which had been seen in its gills, and another was found in the Devil Fish's mouth, though afterward slipped into the stomach. One of my New Jersey remoras was also found in the Devil Fish's mouth, though the other was on the outer part of its host's body.

A. H. S. P., No. and

Brielle, New Jersey. August 27, 1933.

A. L. Kahn. Length 158 to 222 mm.

From Manta birostris.

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Remora australis Bennett

Echeneis australis Bennett, Narrative
Whaling Voyage, vol. 2, p. 273, 1840
(type locality, Australasia).

Remilegia australis Gill, Proc. Acad.
Nat. Sci. Philadelphia, March 1864,
p. 61 (discussion).

Remora australis McCulloch, Austral.
Mus. Mem., no. 5, pt. 3, p. 382, Nov.
28, 1929 (reference).

~~*Remora scutata* (Günther)~~

Echeneis scutata Günther, Ann. Mag. Nat. Hist., London, ^{ser. 3,} vol. 5, p. 401, pl. 10, fig. B, 1860 (type locality, Indian Ocean, Ceylon); Cat. Fish. Brit. Mus., vol. 2, p. 381, 1860 (Ceylon; India); Nat. Hist. Ceylon, Tennent, p. 361, 1861 (reference).

Depth $9\frac{1}{2}$ in total; head $3\frac{1}{2}$.
 Eye small; mouth cleft reaches only to vertical from nostril; upper jaw subtruncated, overreached by lower, which much narrower, and both armed with broad band of villiform teeth, with outer series of larger ones on sides; vomerine and palatine bones with continuous band of teeth, narrowest on vomer; tongue hard, cartilaginous, destitute of teeth.

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Scales minute, imbedded in
pore like cavities and only visible
under lens.

D. XXVII — 22, elongate, subellipti-
cal disk. obtusely rounded anteriorly
and posteriorly, extends backwards
beyond vertical from ventral
tips, length $2\frac{1}{3}$ in total; spines
with which single laminae
armed little conspicuous and
rough to touch, also large posterior
part of disk without laminae
and quite smooth; disk width $\frac{1}{3}$
its length and membranaceous
margin bent upwards; interdorsal
space $3\frac{1}{2}$ in disk length; second
dorsal low, enveloped in thick
membrane; A. 21 to 23, opposite and
similar to second dorsal; caudal
truncated as expanded; pectoral
9 in total, rounded, small;

Echidna zebra (Shaw).

Gymnothorax zebra Shaw, Naturalist's Miscellany, vol. 9, 1797, p.

22 (type locality, "American Seas" = Indo-Pacific).

Echidna zebra Snyder, Bull. U. S. Fish Comm., vol. 22, 1902 (1904),

520 (Honolulu).—Jordan and Evermann, op. cit., vol. 23, pt. 1, 1903 (1905),

106, pl. 20 (Honolulu; Kailua).—Fowler, Mem. Bishop Mus., vol. 10, 1928, p.

3, pl. I E (Honolulu; Hawaii; Society Is.).

Muraena zebra Günther, Journ. Mus. Godeffroy, vol. 9, pt. 17, 1910,

422 (Society Is.).

ventral slightly pointed, with spine hidden in skin and 4 soft rays, inserted immediately behind vertical from pectoral, which equal in length, both fins received in shallow groove on abdomen.

Color brown.

Length 178 to 585 mm. (Günther.)
Indian Ocean.

Rataboura javanica (Kaup).

Aphthalmichthys javanicus Kaup, Cat. Apod. Fish, 1856, p. 105, fig. 71

type locality, Java).—Fowler, Mem. Bishop Mus., vol. 10, 1928, p. 47 (type of Moringua hawaiiensis).

Moringua javanica Seale, Occas. Pap. Bishop Mus., vol. 4, no. 1, 1906,

12 (Nukuhiva, Marquesas).—Günther, Journ. Mus. Godeffroy, vol. 9, pt. 17, 1910, p. 405 (Taumotus).

Rataboura javanica Fowler, Mem. Bishop Mus., vol. 11, no. 6, 1934, p.

39 (reference).

Moringua hawaiiensis Snyder, Bull. U. S. Fish Comm., vol. 22, 1902

1904), p. 517, pl. 3, fig. 6 (type locality, Honolulu).

Remora brachyptera (Lowe)

- Echeneis brachyptera Lowe, Proc. Zool. Soc. London, p. 89, 1839 (type locality, Madeira). — Günther, Cat. Fish. Brit. Mus., vol. 2, p. 378, 1860 (China; Brazil); Journ. Mus. Godeffroy, vol. 5, pt. 11, p. 155, 1876 (Pacific Ocean). — Fowler, Occas. Pap. Bishop Mus., vol. 10, no. 7, p. 387, 1923 (Honolulu). — Sauvage, Hist. Madagascar, Poiss., p. 321, 1891 (reference).
- [Day, Fishes of India, pt. 2, p. 258, pl. 55, fig. 3, 1876 (Madras); Fauna British India, Fishes, vol. 4, p. 215, Kan. fig. 46, 1889. — Franz, Abhandl. Bayer. Akad. Wiss., vol. 4, Suppl. Band 1, p. 69, 1910 (Laburatsubo). — Beekman, Verh. Kon. Akad. Wet. Amsterdam (Zool.), vol. 18, p. 15, 1879 (reference). — Barnard, Ann. South African Mus., vol. 21, pt. 2, p. 421, Oct. 1927 (Table Bay).

Echeneis brachyptera Goyorza, An. Soc. Españ. Hist. Nat. Madrid, vol. 14, p. 73, 1885 (Manila) (error).

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Remora brachyptera Jordan and Nyder,
Annot. Zool. Japon., p. 110, 1901
(reference). — ^{vol. 3,} Fowler, Bull. Amer.
Mus. Nat. Hist., vol. 70, pt. 2, p. 1020, fig.
420, Nov. 18, 1936 (compiled).

Remorina brachyptera Jordan, Tanaka
and Nyder, Journ. College Sci. Tokyo,
vol. 33, p. 311, 1913 (reference).

Remoropsis brachyptera Fowler, Mem.
Bishop Mus., vol. 10, p. 421, 1928 (Honolulu).
— Reeves, Journ. Pan-Pac. Res. Inst.,
vol. 2, no. 3, p. 12, July-Sep. 1931
(reference). — Chu, Biol. Bull. St.
John's Univ., no. 1, p. 168, Jan. 1931
(reference).
Jordan and Hubbs, Mem. Carnegie Mus.,
vol. 10, no. 2, p. 294, June 27, 1925 (Misaki).

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Echeneis sexdecimlamellata Eydoux and
Gervais, Voy. Favorite, Zool., vol. 5, p.
77, pl. 31, 1839 (type locality, Indian
Ocean?).

Echeneis laevis Castelnau, Mém. Poiss.
Afrique Australe, p. 73, 1861 (type
locality, South Africa, on Mola).
Orthogoriscus

Remora nieuhofti Bleeker 2381

Echeneis nieuhofti Bleeker, Nat. Tijds.
ned. Indie, vol. 4, ~~185~~ p. 279, 1853
(type locality, Priaman, Sumatra).

Echeneis nieuhofti Bleeker, Act. Soc.
Sci. Ind. neerl. (Acht. Sumatra), vol.
8, p. 44, Feb. - Aug. 1859 (reference).

Echeneis chirostigma Guichenot, Compt. Rend.
Acad. Sci. Paris, vol. 47, p. 378, 1858 (type
locality, Réunion).

Remora brachyptera (not Powe) Jordan
and Evermann, Bull. U. S. Nat. Mus.,
no. 47, pt. 3, p. 2272, 1898 (part).

Remora remora (Linnaeus)

2382

- Echeneis remora Linnaeus, Syst. Nat., ed. 10, pt. 1, p. 260, 1758 (type locality, "in Pelago Indico"). — Osbeck, Reise Ost Ind. China, p. 94, 1765 (Canaries).
— Linnaeus, op. cit. ed. 12, pt. 1, p. 446, 1766 (copied). — Forskål, Descript. Animal., p. ~~XIX~~, 1775 (Malta). —
Bloch, Naturg. Ausl. Fische, vol. 2, p. 134, pl. 172, 1786 (world seas).
— Bonnaterre, Tabl. Ichth., p. 57, pl. 33, fig. 123, 1788 (compiled).
— Gmelin, Syst. Nat. Linnaeus, p. 1187, 1789 (Atlantic, Mediterranean, Pacific). — White, Journ. Voy. New South Wales, p. 296, pl. 3, 1790 (New South Wales).
— Lichtenstein, Descript. Animal. Forster, p. 257, 1844 (Japan).

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— Walbaum, Artedi Pisc., vol. 3, p. 96,
1792 (copied). — Forster, Fauna Indica
p. 14, 1795 (reference). — Blumenbach,
Handb. Naturg., p. 271, 1799 (reference).
— Schneider, Syst. Ichth. Bloch,
p. 240, 1801 (copied). — Lacépède,
Hist. Nat. Poiss., vol. 3, p. 147, pl. 9,
fig. 1, 1802 (the sea). — Shaw and
Nodder, Naturalists miscellany,
vol. 13, pl. 511, 1802 (Mediterranean;
Atlantic). — Blumenbach, Abild.
Naturhist. Gegenst., ed. 2, p. 78,
1810 (reference).

— Lichtenstein, Descript. Animal. Forster,
p. 257, 1844 (Fauna).

Echidna polyzona (Richardson).

Muraena polyzona Richardson, Voy. Sulphur, Fish., 1844, p. 112, pl. 1, figs. 11 to 14 (type locality, not given).—Günther, Journ. Mus. Godeffroy, vol. 9, pt. 17, 1910, p. 422 (Marquesas Is.; Tahiti).

Poecilophis polyzona Kner, Reise Novara, Fische, vol. 1, 1865, p. 382 (Tahiti).

Echidna polyzona Fowler, Proc. Acad. Nat. Sci. Phila., 1900, p. 496 (Honolulu).—Seale, Occas. Pap. Bishop Mus., vol. 4, no. 1, 1906, p. 12 (Nukuhiva, Marquesas).—Fowler, op. cit., 1912, p. 30 (Hawaiian Is.); Copeia, no. 2, Nov. 20, 1922, p. 82 (Hawaii); Bishop Mus. Bull., no. 38, 1927, p. 6 (Christmas I.); Mem. Bishop Mus., vol. 10, 1928, p. 48, fig. 11 (Honolulu; Nukuhiva; Fakarava; Hawaii; Society Is.; types of E. leihala, E. psalion, E. obscura, E. vincta, E. zonata and E. sauvagei).

Echidna tritor Vaillant and Sauvage, Rev. Mag. Zool., ser. 3, vol. 3, 1875, p. 287 (type locality, Hawaiian Islands).—Jordan and Snyder, Bull. U. S. Fish Comm., vol. 26, 1906 (1907), p. 208 (Honolulu).—Kendall and Goldsborough, Mem. Mus. Comp. Zool., vol. 26, 1911, p. 248 (Fakarava, Taumotus).

Leihala tritor E.K. Jordan, Proc. U. S. Nat. Mus., vol. 60, 1925, p. 5, pl. 1, figs. 1 and 2 (Honolulu).

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— Schlegel, Fauna Japonica, Poiss., pt. 15,
p. 271, 1846 (Cape of Good Hope; Japan). — Kittlitz, Senkaw. Reis.
Mikronesien, vol. 1, p. 57, 1858 (N. Lat. 5° Pacific Ocean).
— Günther, Cat. Fish. Brit. Mus., vol. 2,

p. 378, 1860 (Guernsey; Madeira; Cape
of Good Hope; India; China Seas;
South Sea; Port Essington; Bass Strait);
Zool. Record, Piper, p. 155, 1864 (synonym).
— Kner, Reise Novara, Fische, p. 146,
1865 (Ceylon; Tahiti; Sydney; Atlantic
Ocean). — Bleeker, Faune Madagascar,

Pollén and Van Dam, Poiss., p. 99, 1874.
— Schmeltz, Cat. Mus. Godeffroy, no. 4, p. 17, 1869 (Yamoa);
no. 5, p. 26, 1874 (Yamoa).

— Day, Fishes of India, pt. 2, p. 258,
1876 (compiled).

— Günther, Journ. Mus. Godeffroy, vol. 5,
pt. 11, p. 156, 1876 (all warm seas). — Streets,
Bull. U. S. Nat. Mus., no. 7, p. 92, 1877
(Washington D., Fanning Group).

— Martens, Preuss. Exped. Ost Asien, vol. 1, p. 390,
1876 (Macassar).

— Peters, Monatsb. Akad. Wiss. Berlin, p.
1029, 1880 (Hong Kong).

— Günther, Rep. Voy. Challenger, vol. 31, p. 18, 1889
(Atlantic; Hawaiian Is.; Pacific). — Day,
~~Fishes of India~~, Fauna British India,
Fishes, vol. 2, p. 215, 1889.

— Jordan and Snyder, Annot. Zool. Japon.;
p. 1110, 1901 (reference). — Steindachner, Denks.
Akad. Wiss. Wien, vol. 70, p. 496, 1901 (between
Honolulu and Cape Horn). — Snyder, Bull. U. S.
Fish Comm., vol. 22, p. 536, 1902 (1904) Hanalei Bay and of Hawaiian Is.

— Franz, Abhandl. Kon. Bayer. Akad.
Wiss., vol. 4, Suppl. Band 1, p. 70, 1910
(Misaki). — Jordan, Tanaka and Snyder,

Journ. College Sci. Tokyo, vol. 33, p. 311,
1913 (reference).

— Kendall and Goldsborough, Mem. Mus. Comp. Zool., vol.
26, p. 331, 1911 (Society Islands; Fakarua). — Southwell, Ceylon
Adm. Rep. p. E 51, 1912-1913 (reference).

— Gilchrist and Thompson, Ann. Durban
Mus., vol. 1, pt. 4, p. 406, 1917 (reference).

— Thompson, Mar. Biol. Rep. South
Africa, vol. 4, p. 133, 1918 (reference).

~~Barnard, Ann. South African Mus.,
vol. 21, p. 12, 1918, p. 13, 1919, p. 14, 1920,
p. 15, 1921 (reference).~~

— Jordan and Evermann, Bull. U. S. Fish
Comm., vol. 23, pt. 1, p. 494, 1903 (1905) (Honolulu).
— Steindachner, Sitzb. Ber. Akad. Wiss.
Wien, vol. 115, pt. 1, p. 1407, 1906 (Upolu).

— Fowler, Copeia, no. 112, p. 84, Nov. 20, 1922
 (Hawaiian Is.). — Fowler and Ball,
 Bull. Bishop Mus., no. 26, p. 27, 1925
 (Wake I.). — Fowler, Bull. Bishop
 Mus., no. 38, p. 29, 1927 (Baker I.). —
Barnard, Ann. South African Mus.,
 vol. 21, pt. 2, p. 422, pl. 18, fig. 1, Oct.
 1927 (Katal). — Fowler, Mem. Bishop
 Mus., vol. 10, p. 419, fig. 65, 1928
 (Hawaiian Is.; Honolulu; N. Lat. 6°
 W. Long. 162°; Marcus I.; Wake I.;
 Hulls Sound; Hulls I.; Tuamotu;
 Tahiti; Fanning; Fakarava; between
 Easter I. and Galapagos; Society Is.;
 Apiang; Elton I.).

Remora remora Jordan and Snyder,
Proc. U. S. Nat. Mus., vol. 27, p. 946,
1904 (Honolulu). — Jordan and Dickerson,
Proc. U. S. Nat. Mus., vol. 34, p. 617, 1908
(Suva, Fiji). — Jordan and Jordan,
Mem. Carnegie Mus., vol. 10, no. 1, p. 77,
Dec. 1922 (Hawaii). — Reeves, Journ.
Pan-Pac. Res. Inst., vol. 2, no. 3, July-
Sep. 1927 (reference). — Chu, Biol.
Bull. St. John's Univ., no. 1, p. 168,
Jan. 1931 (reference).
Annot. Zool. Japon., vol. 3, p. 110, 1901 (^{Nagasaki}~~Yokohama~~).
(— Jordan and Hubbs, Mem. Carnegie Mus.,
vol. 10, no. 2, p. 294, June 27, 1925 (Misaki).
— Fowler, Bull. Amer. Mus. Nat. Hist.,
vol. 70, pt. 2, p. 1019, Nov. 18, 1936.
(Madeira; open Atlantic; Mediterranean).

Echeneis squalipeta Daldorf, Skriver.
Naturh. Hetsk., vol. 2, p. 157, 1797
 (type locality, Atlantic between the
 tropics). Günther, Cat. Fish.
Brit. Mus., vol. 2, p. 377, 1860 (copied).

Echeneis remoroides Bleeker, Nat. Tijds.
Ned. Indie, vol. 2, p. 70, 1855 (type
 locality, Batoe).

Echeneis parva Gray, Cat. Fish. Gronow,
 p. 92, 1854 (type locality, "Oceano
 Americano").

Echeneis borboniensis Guichenot, Hist.
Nat. Réunion, Maillard, Appen., p. 19,
 1862 (type locality, Réunion).

Echeneis remeligo (A. Duméril) Guichenot,
op. cit.

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Remora albescens (not Schlegel) Fowler,
Proc. Acad. Nat. Sci., Philadelphia,
p. 517, 1900 (Hawaiian Islands). —
Seale, Occas. Pap. Bishop Mus., vol.
1, no. 5, p. 21, 1902 (Honolulu). —
Bryan and Herre, Occas. Pap.
Bishop Mus., vol. 2, no. 1, p. 135, 1902
(1903) (Marcus J.).

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Depth $5\frac{1}{3}$ to $7\frac{1}{3}$; head $3\frac{2}{5}$ to 4, width $1\frac{2}{5}$ to $1\frac{2}{3}$. Snout 2 to $2\frac{1}{3}$ in head from snout tip; eye $5\frac{2}{5}$ to $7\frac{1}{5}$, $2\frac{1}{2}$ to 3 in snout, $4\frac{3}{4}$ to 5 in interorbital; maxillary not quite reaching front of eye, length $2\frac{1}{8}$ to $2\frac{3}{4}$ in head from snout tip; teeth rasp like, outer lower ones enlarged. Gill rakers 2 + 13, lanceolate, $\frac{3}{5}$ of gill filaments, which little longer than eye.

Skin smooth.

D. XVI to XX - IV, 24 or 25, second fin height $2\frac{4}{5}$ to 3 in total head length; A. IV, 23, I or 24, I, fin height $2\frac{1}{3}$ to $2\frac{2}{5}$; caudal $1\frac{1}{6}$ to $1\frac{1}{2}$, lunate, less so in young; least depth of caudal peduncle $4\frac{3}{5}$ to 5; pectoral $1\frac{3}{4}$ to $1\frac{4}{5}$; ventral $1\frac{4}{5}$ to 2.

Uniform brown, paler or 2391
grayish to blackish.

Circumtropical. Natal, South
Africa, Reunion, Madagascar,
India, Ceylon, East Indies,
China, Japan, New South Wales,
Western Australia, Victoria,
Melanesia, Micronesia, Polynesia,
Hawaii.

2392

Genus Rhombochirus Gill

Rhombochirus Gill, Proc. Acad. Nat.
Sci. Philadelphia, p. 88, 1863.
(Type Echeneis osteochir Cuvier,
monotypic.)

Similar to Remora but with
firm, rigid osseous pectorals.
These have broad, stiff,
partly ossified, flat rays,
especially the upper of the
fin. Dorsal fin pectoral short,
broad, subrhomboid.
Accompanies and attaches
to Makaira and Istiophorus.

2393

Rhombochirus megalodiscus (Franz)

Echeneis megalodiscus Franz, Abhandl.
Kon. Bayer. Akad. Wiss., vol. 4,
Suppl. Band 1, p. 69, pl. 8, fig. 57,
1910 (type locality, Yokohama).

Rhombochirus megalodiscus Jordan,
Tanaka and Snyder, Journ. College
Sci. Tokyo, vol. 33, p. 311, 1913 (reference).
— Tanaka, Fishes of Japan, pt. 21,
p. 381, pl. 104, figs. 320 to 323, 1915
(Sagami Sea).

2394

Genus Phtheirichthys Gill

Phtheirichthys Gill, Proc. Acad. Nat. Sci. Philadelphia, p. 239, 1862.
(Type Echeneis lineatus menzies,
monotypic.)

Greatly like Echeneis, differing
in the more elongated slender
body. Teeth in bands in jaws.
Palatines with sharp teeth.
Disk with 10 plates.

2395

Phtheichthys lineatus (Menzies)

Echeneis lineatus Menzies, Trans.
Linn. Soc. London, vol. 1, p. 187, pl.
17, fig. 1, 1791 (type locality, Pacific
Ocean between the Tropics, adhering to
turtles).

— Günther, Cat. Fish. Brit. Mus., vol. 2, p.
382, 1860); Journ. Mus.
Godeffroy, vol. 5, pt. 11, p. 156, pl. 97, 1876
(Pacific Ocean).

Phtheirichthys lineatus Barnard, Ann.
South African Mus., vol. 21, pt. 2, p. 419,
Oct. 1927 (Table Bay). — Fowler, Mem.
Bishop Mus., vol. 10, p. 421, 1928
(h. lat. 6° W. long. 162°); Bull. Amer.
Mus. Nat. Hist., vol. 70, pt. 2, p. 1020,
Nov. 18, 1936 (no locality; Atlantic
north of tropics; Pacific Ocean).

2397

Genus Echeneis Linnaeus

Echeneis Linnaeus, Syst. Nat., ed.
10, pt. 1, p. 260, 1758. (Type
Echeneis nucrates Linnaeus,
designated by Gill, Proc. Acad.
Nat. Sci. Philadelphia, p. 239,
1862.)

Leptecheneis Gill, op. cit., p. 60. (Type
Echeneis nucrates Linnaeus,
monotypic.)

2398

Body well elongated, slender, tapers cylindrically to caudal fin. Head small, broadly depressed above. Snout broad, depressed. Eye rather small, median and lateral in head length. Mouth slightly inclined. Teeth uniform. Gill rakers lanceolate. Skin firm, coriaceous. Vertebrae 30, of which 16 caudal. Quisk but little longer than rest of predorsal length, with 20 to 28 plates. Soft dorsal origin median in fish without caudal, and fin long like anal or rays 30 to 41. Caudal less than head, ^{concave or} convex behind in young, ^{lunate} with age. Pectoral moderate, rays soft and flexible. Ventral about long as pectoral.

Echeneis nucerates Linnaeus

Echeneis nucerates Linnaeus, Syst. Nat. ed. 10, pt. 1, p. 261, 1758 (type locality, "In Pelago Indico"). — Hasselquist, Reise Palestina, p. 371, 1762 (Alexandria). — Linnaeus, Syst. Nat., ~~Linnaeus~~ ed. 12, pt. 1, p. 446, 1766 (copied). — Forster, Cat. Animals n. America, p. 20, 1771 (on Catesby). — Forskål, Descript. Animal., p. XIV, 1775 (Djidda; Lohaja, Red Sea). — Block, Naturg. Ausland, Fische, vol. 11, p. 131, pl. 171, 1786 (Europe). — Bonnaterre, Tabl. Ichth., p. 58, pl. 33, fig. 124, 1788 (Atlantic; Mediterranean). — Gmelin, Syst. Nat. Linnaeus, pt. 1, p. 1189, 1788 (all seas). — Walbaum, Arted. Pisc., vol. 3, p. 96, 1792 (copied). — Forster, Fauna Indica, p. 14, 1795 (reference). — Schneider, Syst. Ichth. Block, p. 239, 1801 (copied).

Aphthalmichthys abbreviatus Bleeker, Ned. Tyds. Dierk., vol. 1, 1863,

163 (type locality, Prigi, Java; Batu; Manado, Celebes; Ternate; Amboyna).—

Fowler, Bishop Mus. Bull., no. 38, 1927, p. 6 (Tahiti); Mem. Bishop Mus., vol.

, 1928, p. 47 (compiled).

Rataboura abbreviata Fowler, Mem. Bishop Mus., vol. 11, no. 6, 1934,

p. 389 (reference).

Moringua socialis Günther, Journ. Mus. Godeffroy, vol. 9, pt. 17,

1910, p. 406, pl. 169, fig. A (type locality, Tahiti?).

Echeneis naucrates Linnaeus

Echeneis naucrates Linnaeus, Syst. Nat.,
ed. 10, pt. 1, p. 261, 1758 (type locality,
"In Pelago Indico").

— Bleeker, Verh. Batavia. Genoot. (Chir.),
vol. 24, p. 22, 18 ();
Act. Soc. Sci. Ind. Neerl. (Nacht.
Sumatra), vol. 8, p. 44, Feb. - Aug.
1859 (Telokbetong; Tiker; Priaman;
Siboga). — McCulloch, Austral. Mus.
Mem., no. 5, pt. 3, p. 383, Nov. 28, 1929 (reference).

Echeneis naucrates Richardson, Descript. 2401

Animal., p. 257, 1844 (Tanna; New Caledonia).

— Richardson, Ichth. China and Japan,

p. 203, 1846 (China Seas). — Schlegel,

Fauna Japonica, Poiss., pt. 15, p. 270, pl.

120, fig. 1, 1850 (Nagasaki). — Günther,

Ann. Mag. Nat. Hist. London, ser.

p. 395, 1860 (); Cat.

Fish. Brit. Mus., vol. 8, p. 384, 1870

(

— Castelnau, Proc. Zool. Acclimat. Soc.

Victoria, vol. 2, p. 114, 1873 (Noumea, New

Caledonia). — Günther, Ann. Mag. Nat.

Hist. London, ser. 4, vol. 13, p. 154, 1874

(Chefoo); Journ. Mus. Godeffroy, vol. 5,

pt. 11, p. 156, pl. 97, 1876 (Pacific Ocean).

— Mantoux, Reuss, Exped. Ost Asien, vol. 1, p. 390, 1876 (Bangkok; between Macassar and

— Peters, Monatsb. Akad. Wiss. Berlin,

p. 836, 1876 (1877) (Bougainville, Solomon).

— Alleyne and Macleay, Proc. Linn. Soc. New South Wales, vol. 1, p. 1, 1877 (New South

— Quoy, Mem. Soc. Sci. Nat. Cherbourg,

vol. 21, p. 334, 1877-78 (New Caledonia).

— Kosman, Zool. Anzeiger, vol. 2, p. 22, 1879 (Red Sea).

— Macleay, Proc. Linn. Soc. New South

Wales, vol. 8, p. 266, 1883 (Hood Bay, New

(Guinea). — Klunzinger, Sitzb. Akad. Wiss. Wien, vol. 80, pt. 1, p. 1, 1879 (1880).

— Károli, Termesz. Füzetek, Budapest, vol. 1, p. 162, 1876 (Verangoon;

— Larawak, Proc. Linn. Soc. New South Wales, vol. 2, p. 1, 1878 (Cardwell).

— Meyer, Anal. Soc. Españ. Hist. Nat. Madrid, vol. 14, p. 27, 1885 (Rubi, New Guinea).

— Günther, Rep. Voy. Challenger, vol. 31, pt. 2, p. 18, 1888 (1889) (Kandavu). —
St. Thomas, W.I.

— Waite, Mem. Australian Mus., no. 3, p. 190, 1897 (Funafuti, Ellice Is.). —

Fowler, Proc. Acad. Nat. Sci. Philadelphia, p. 528, 1900 (Samoa). —

Jordan and Snyder, Annot. Zool. Japon., vol. 3, p. 110, 1901 (^{Yokohama; Nagasaki} ~~reference~~). — Jordan and

Seale, Bull. Bur. Fisher., vol. 25, p. 411, 1905 (1906) (Cepia); vol. 26, 1906 (1907) (Manila). — Evermann and Seale,

Bull. Bur. Fisher., vol. 26, p. , 1906 (1907) (Bulan). — Weber, Nova Guinea,

vol. 5, pt. 3, p. 263, 1908 (Inioe Kowar, Meranke R.; west coast of New Guinea).

— Jordan and Richardson, Philippine Journ. Sci., p. 51, 1910 (reference). —

Kendall and Goldsborough, Mem. Mus. Comp. Zool., vol. 26, p. 330, 1911 (Fakarawa and Makemo, Paumotu; Funafuti).

— Gilchrist and Thompson, Ann. Durban Mus., vol. 1, pt. 4, p. 405, 1917.

Ann. South African Mus., vol. 13, p. 79, 1913 (Durban Mus.). — Pearson, Ceylon Adm. Rep., pp. F9, ~~F10~~, F11, F15, F18, 1915-18 (reference).

— Malpas, Ceylon Adm. Rep., p. E8, 1921 (reference).

— McCulloch and W. H. H. H. H., Mem. Queensland Mus., vol. 8, pt. 2, p. 173, July 7, 1925 (reference).

— Reeves, Journ. Pan-Pac. Res. Inst., vol. 2, no. 3, p. 17, July-Sep. 1931 (reference).

— Chu, Biol. Bull. St. John's Univ., no. 1, p. 168, Jan. 1931 (reference).

— Ogilby, Commere. Fish. Fisher. Queensland, p. — 1915 (Brisbane R.; No. 1 - West Island).

— Fowler, Bull. Amer. Mus. Nat. Hist., vol. 13, pt. 2, p. 122, p. 123, Nov. 18, 1931 (Mediterranean; No. 1 - West Island).

2404

Leptecheneis naucratus Bleeker, Arch.
Néerl. Sci. Nat. Harlem, vol. 13, p. 37,
1878 (New Guinea).
Gill, Proc. Acad. Nat. Sci. Philadelphia,
March 1864, p. 61 (reference). —

Bleeker, Verh. Kon. Akad. Wet. Amsterdam (Jap.),
vol. 18, p. 15, 1879 (reference). —

Leptecheneis naucratus Jordan, Tanaka and
Snyder, Journ. College Sci. Tokyo, vol. 33,
p. 310, 1913 (reference). — Tanaka,
Fishes of Japan, pt. 21, p. 378, pl. 103,
figs. 315-319, 1915 (). —
Fowler, Bull. Bishop Mus., no. 22, p. 36,
1925 (Samoa). — Barnard, Ann. South
African Mus., vol. 21, pt. 2, p. 420, Oct.
1927 (False Bay; East London; Natal).
— Fowler, Mem. Bishop Mus., vol. 10, p.
420, fig. 60 (young), 1928 (type of
Leptecheneis flaviventris; Samoa?;
Makemo; Funafuti; Elbon I.; Tuamotus).
— Anonymous, Illustrat. Jap. Aquat. Pl.
Animals, vol., pl. 44, fig. 10, 1931.

2405

Echeneis naucratooides Zuiew, nov. Act.
Acad. Sci. Petropol., vol. 4, p. 279, 1789
(type locality, locality not given).

Echeneis vittatus Jouan, Mém. Soc.
Sci. Cherbourg, vol. 21, p. 334, 1877-78
(on Echeneis Jouan, op. cit., vol. 8, p.
254, no. 22, 1861, Port de France,
New Caledonia). — Martens, Verh. Zool.
Bot. Ges. Wien, vol. 16, p. 378, 1866 (Missa
Eléi, Red Sea).
Leptecheneis flaviventris Seale, Occas.
Pap. Bishop Mus., vol. 4, no. 1, p. 83,
fig. 23, 1906 (type locality, Mangareva
Island).

Echeneis australis Griffith, Animal
Kingdom Cuvier, Fishes, p. 504,
(type locality,

Caecula polyophthalma (Bleeker).

Dalophis polyophthalmus Bleeker, Nat. Tyds. Ned. Indie, vol. 4, 1853,
299 (type locality, Priaman, Sumatra).

Caecula polyophthalma Fowler, Mem. Bishop Mus., vol. 10, 1928, p. 46
(compiled); vol. 11, no. 6, 1934, p. 389 (reference).

Caecula polyophthalmus Fowler, Occas. Pap. Bishop Mus., vol. 9, no.
1, 1932, p. 3 (Tahauku Bay, Kivaoa, Marquesas).

Ophichthys punctulatus Günther, Journ. Mus. Godeffroy, vol. 9, pt. 17,
10, p. 403 (Tahiti).

2407

Depth 8 to $9\frac{1}{4}$; head $4\frac{3}{5}$ to 5,
width $1\frac{1}{2}$ to $1\frac{3}{4}$. Snout 2 to
 $2\frac{1}{8}$ in head measured from
snout tip; eye $5\frac{1}{2}$ to 7, $2\frac{1}{4}$ to
 $2\frac{3}{4}$ in snout, 3 to $3\frac{4}{5}$ in
interorbital; maxillary reaches
within eye diameter of eye, length
 $2\frac{4}{5}$ to 3 in head from snout
tip; teeth rasp like; disk
width $2\frac{1}{2}$ to $2\frac{3}{4}$ in its length.
Gill rakers 3 + 12, lanceolate,
 $2\frac{1}{3}$ in eye.

Skin coriaceous.

D. XXI or XXII, II, 32 to 36,
fin height $2\frac{1}{2}$ to 3 in total
head length; A. II, 34 to 37,
fin height $2\frac{1}{8}$ to $2\frac{2}{3}$; caudal
 $1\frac{1}{2}$ to $1\frac{4}{5}$, truncate to little
convex, or upper and lower edges
little angulate, median rays
slightly exerted in median
point behind in young; least

Trypanchena vagina Cantor, Journ.
Asiatic Soc. Bengal, vol. 18, p. 2,
p. 1172, 1849 (1850) (Penang).

Trypanchen vagina vagina Tomiyama,
Jap. Journ. Zool., vol. 7, no. 1, p. 104,
1936 (Tainan, Formosa).

2408

depth of caudal peduncle $6\frac{1}{2}$ to $7\frac{1}{3}$
in total head length; pectoral
 $1\frac{2}{5}$ to $1\frac{1}{2}$; ventral $1\frac{2}{5}$ to $1\frac{4}{5}$.

Dark brown, belly dark
like back, young sometimes
mottled little paler below.
Broad lateral dark gray to
black band, from snout to
caudal, edges whitish. All
colors more or less contrasted
or defined in young. Dorsal
and anal broadly edged white
in front. Caudal black, outer
angles white. Paired fins blackish,
edges often paler.

Circumtropical. Red Sea,
Arabia, South Africa, East
Indies, Siam, Philippines, China,
Japan, Queensland, Melanesia,
Micronesia, Polynesia.

Trypauchen vagina (Schneider)

Gobius vagina Schneider, Syst.
Ichth. Bloch, p. 73, 1801 (type
locality, Tranquerah).